THE

# YOUNG MECHANIC.

JUNE, 1833.

## CHEMISTRY.

[Continued from page 70.]

### THE ATMOSPHERE.

The atmosphere is composed essentially of two gases, oxygen and nitrogen; which have been described in the preceding sections. Water and carbonic acid gas also form a part, and there are doubtless other vapors and gases which enter into its composition, though not in sufficient quantity as to be detected by experiment. The proportions in which the constituents of the atmosphere are united, have been differently stated by different chemists. The following statement will not vary much from the truth.

Nitrogen 75.55; Oxygen 23.32; Water 1.03; Carbonic acid 0.10.

The atmosphere is transparent, colorless, insipid, inodorous, elastic, a bad conductor of heat and electricity. Its specific gravity is 1; it is unity for all other æriform fluids. 100 cubic inches Bar. 30 Therm. 60 weigh 30 1-2 grains.

It is 828 times lighter than water.

The weight of the atmosphere at the level of the sea, is about 15lbs. on the square inch, and is equal to a column of water 34 feet, or a column of mercury 30 inches in height.

From numerous analysis of the air obtained from different parts of the globe, from great distances above its surface, and from the deepest mines, it has been inferred that the proportions of oxygen and nitrogen never vary, except from the operation of limited local causes. It is not improbable, however, that more delicate experiments may in time, show that such is not the fact; but that the proportions of these bodies are variable. The state in which these gases exist, whether of mechanical mixture or chemical

combination, has never been satisfactorily determined. The general opinion is, that they are not chemically united. The other constituents of the atmosphere are known to vary in quantity at different times. At great heights, the quantity of water is very small; caustic potassa on the peak of Teneriffe, 12176 feet above the sea remained dry. Carbonic acid gas has been detected in the air at every height hitherto attained.

The methods adopted for analysing the air, are numerous, and in all, the oxygen is separated from the nitrogen by presenting to it some substance for which it possesses an affinity. Any of the methods enumerated in the article on nitrogen for obtaining that gas, will answer the purpose. We have only to make use of a graduated tube closed at one end, for our experiment, and note the diminution in bulk which has taken place after the whole of the oxygen has been absorbed. The method most generally adopted, and probably the best, consists in igniting hydrogen gas mixed with the air to be examined. 100 measures of oxygen gas require 200 measures of hydrogen for complete combustion. If, therefore, we mix a portion of air with about half its bulk of hydrogen, in a graduated glass tube, and fire the mixture, by an electric spark over water, one third of the diminution in bulk which takes place will be the proportion of oxygen which the mixture contained. By deducting the volume of oxygen gas from the volume of air examined, we obtain the proportion of nitrogen.

For the best method of ascertaining the proportions of carbonic acid and water, which has fallen within my notice, I am indebted to a late memoir by M. Brunner. The apparatus which he describes, to be used for this purpose, consists of a cylindrical glass or metal vessel, having an orifice near the top, in which is inserted a glass tube eleven or twelve inches long, and from three lines to three and a half in diameter, internally, with enlargements near each end. At the bottom of the vessel is a stop-cock.

To use this apparatus for the determination of the quantity of water in the atmosphere, the vessel is filled with water, and the glass tube, lined with amianthus, moistened with sulphuric acid, is inserted into its upper orifice after having been carefully weighed. The stop cock is then opened, and the water suffered to flow slowly into a graduated vessel. When a sufficient quantity of air has been thus exposed to the action of the sulphuric acid, which is known by the quantity of water drawn off, the glass tube is carefully wiped and weighed, and the increased weight shows the proportion of water.

In order to ascertain the proportion of carbonic acid, the same apparatus is made use of, with the exception of the tube, a larger one being necessary for this purpose. A glass tube of the same diameter as the former, and three feet long, having the first two thirds of it filled loosely with hydrate of lime, and the latter with

amianthus moistened with sulphuric acid, is inserted into the cylinder, and air having previously been deprived of its water, is made to pass through it in the same manner as before mentioned. The hydrate of lime will combine with the carbonic acid, and the increased weight of the tube compared with the bulk of water drawn from the vessel will show us the proportion which the air contained. The use of the sulphuric acid in the tube is to combine with the water which is set free from the hydrate of lime by the carbonic acid.

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## GEOMETRY AND ARITHMETIC.

[Continued from page 73.]

### POLYGONS.

Polygon signifies many corners, and is the general name for all rectilineal figures. A regular polygon is one whose sides and angles are all equal. Each polygon has a particular name to denote the number of its sides. Thus a trigon or triangle has 3 sides; a tetragon or square 4; a pentagon 5; a hexagon 6; a heptagon 7; an octagon 8; a nonagon 9; a decagon 10; an undecagon 11; a duodecagon 12, &c.

The area of a regular polygon is found by multiplying the sum of all the sides, (the perimeter,) by half the radius of the inscribed circle; or multiply the radius by half the perimeter.

Fig. 1.

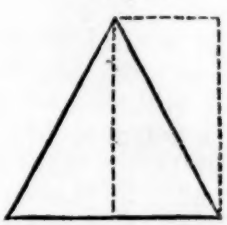


Fig. 2.

Example.—Suppose it be required to find the area of a hexagon, the length of each side being 60 feet, and the radius of the inscribed circle, (or dotted line A fig. 2,) 52 feet. First 3 times 60 equal 180 the length of half the perimeter, which being multiplied by 52, gives 9360 square feet the area.

If lines be drawn from each angle to the centre of the polygon as in figure 2, as many triangles will be formed as there are sides in the polygon; and if the area of one triangle be found, and multiplied by the whole number of triangles, we shall then have the area of the whole polygon. By examining figure 1, it will be seen

that the area of a triangle, is equal to a parallelogram of the same height by half the base; also, that the triangle marked A figure 2, is equal to a parallelogram, whose height is equal to the radius of the inscribed circle, and base equal to half one side of the polygon; that the 6 triangles are equal to 6 such parallelograms; which being placed side by side, would form a parallelogram, whose height is equal to the radius of the inscribed circle, and base equal to half the perimeter of the polygon; hence the rule given above.

### CIRCLE.

A circle is a plane surface, of which the boundary called the circumference is, in all its points, equally distant from a single point called the centre. A straight line, as A C fig. 3, drawn from the centre of a circle to any point of the circumference, is called a radius. A straight line, as A B fig. 3, passing through the centre and terminating at each end in the circumference, is called a diameter.

Fig. 3.

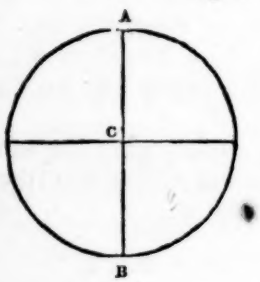
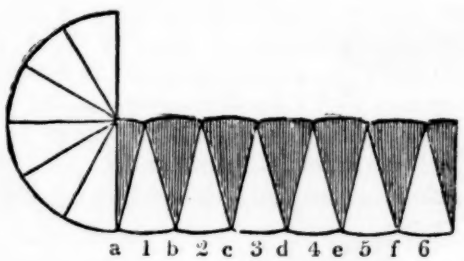



Fig. 4.




Although no part of the circumference of a circle is straight, yet we may without error, regard the circle as a polygon composed of an infinite number of straight sides, it will then be as easy to find the area of a circle, as it is that of a polygon. In fig. 4, is represented half a circle divided into 6 parts, the other half is supposed to be divided in a similar manner, and to be thrown open; which may be done by cutting the radius lines, and having the parts fastened by hinges at a b c d e f. These parts are marked 1 2 3 4 5 6. If the other half of the circle was opened in a similar manner, it would occupy the shaded parts which complete the parallelogram. Two sides of this parallelogram are perfect, being formed of straight lines, the other two are imperfect, being formed of curved lines; but if instead of dividing this circle into 12 parts, it had been divided into 12,000 parts, it would be impossible to tell whether the parallelogram formed in this way, was made up of curved lines or not. In order to be convinced of this truth, let us make a calculation. The circumference of the above circle

is about 3 inches, and 3 inches divided into 12,000 parts would be 4,000 divisions in each inch. How thick a volume would 4,000 leaves, or 8,000 pages make ? I find by measuring several books, that there are about 200 leaves in an inch, so that it would take 20 such parts to be equal in length to one thickness of common printing paper. If a line whose length is only one-twentieth of the thickness of such paper could be seen at all, it would be impossible to tell whether it was curved or straight; it would be a mere point; and a succession of such points would form a straight line; and yet 12,000 the proposed division falls far short of infinity. So that it is perfectly correct to say, that the area of a circle is found by multiplying half the diameter by half the circumference. The only difficulty is in finding the ratio or proportion between the diameter and circumference which I will endeavor to explain in my next. PHILO.

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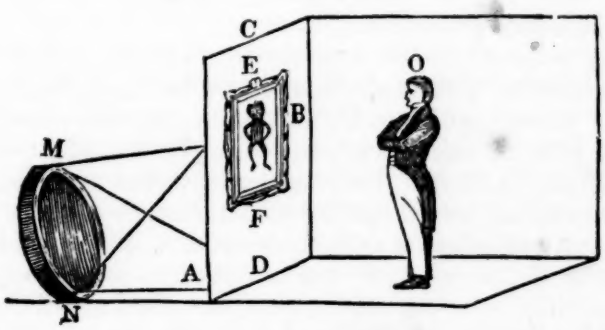
From Brewster's Natural Magic.

## DECEPTIONS WITH THE CONCAVE MIRROR.




The concave mirror is the staple instrument of the magician's cabinet, and must always perform a principal part in all optical combinations. In order to be quite perfect, every concave mirror should have its surface elliptical, so that if any object is placed in one focus of the ellipse, an inverted image of it will be formed in the other focus. This image, to a spectator rightly placed, appears suspended in the air, so that if the mirror and the object are hid from his view, the effect must appear to him almost supernatural.

The method of exhibiting the effect of concave mirrors most advantageously is shown in the cut above, where C D is the partition of a room having in it a square opening E F, the centre of which is about five feet above the floor. This opening might be surrounded with a picture frame, and a painting which exactly filled it might be so connected with a pulley that it might be either slipped

aside, or raised so as to leave the frame empty. A large concave mirror M N is then placed in another apartment, so that when any object is placed at A, a distinct image of it may be formed in the centre of the opening E F. Let us suppose this object to be a plaster cast of any object made as white as possible, and placed in an *inverted* position at A. A strong light should then be thrown upon it by a powerful lamp, the rays of which are prevented from reaching the opening E F. When this is done, a spectator placed at O will see an erect image of the statue at B, the centre of the opening—standing in the air, and differing from the real statue only in being a little larger, while the apparition will be wholly invisible to other spectators placed at a little distance on each side of him.

If the opening E F is filled with smoke rising either from a chafingdish, in which incense is burnt, or made to issue in clouds from some opening below, the image will appear in the middle of the smoke depicted upon it as upon a ground, and capable of being seen by those spectators who could not see the image in the air. The rays of light, in place of proceeding without obstruction to an eye at O, are reflected, as it were, from those minute particles, of which the smoke is composed, in the same manner as a beam of light is rendered more visible by passing through an apartment filled with dust or smoke.

It has long been a favorite experiment to place at A, a white and strongly illuminated human skull, and to exhibit an image of it amid the smoke of a chafingdish at B; but a more terrific effect would be produced, if a small skeleton, suspended by invisible wires, were placed as an object at A. Its image suspended in the air at B, or painted upon smoke, could not fail to astonish the spectator.

The difficulty of placing a living person in an inverted position, as an object at A, has no doubt prevented the optical conjurer from availing himself of so admirable a resource; but this difficulty may be removed, by employing a second concave mirror. This second mirror must be so placed as to reflect towards M N the rays proceeding from an erect living object, and to form an inverted image of this object at A. An erect image of this inverted image will then be formed at B, either suspended in the air or depicted upon a wreath of smoke. This aerial image will exhibit the precise form and colors and movements of the living object, and it will maintain its character as an apparition if any attempt is made by the spectator to grasp its unsubstantial fabric.

## SIMPLIFIED APPLICATION OF STEAM.

At a meeting of the Paris Academy of Arts and Sciences, held on 7th January, a memoir was read, in which M. Pelletan treated of the dynamic effects of a jet of steam, and the means of applying it, in a simple and cheap way, to the purposes of the useful arts. 'A jet of steam,' says the author, 'when thrown into a cylindrical conduit, or into a pipe filled with air, imparts the active power with which it is endued to the column of air, without any other loss than that occasioned by the friction in the conduit, or pipe.'

His detail of the results, which have already ensued from his discovery, are deserving of attentive notice. A jet of steam issuing through an orifice of a milimetre, (·03937 of an inch) under a pressure of five atmospheres, possesses a velocity of five hundred and fifty-nine metres, (1084 3-8 feet,) per second; it consequently moves at the same rate of velocity as a bullet discharged from a gun.

But this enormous velocity is, in its simple form, of no practical benefit, inasmuch as it cannot be converted into a useful agent; when, however, the steam has been enabled to impart motion to a quantity of atmosphere, the velocity, it is true, is diminished, but the mass set in motion is increased; and by this operation, the active power of the jet of steam is susceptible of general application.

The elastic force of steam has hitherto been employed under pressure, by the aid of machines, which are necessarily complicated, and involve a serious loss of power from their bulkiness and friction; but steam, acting immediately by its own power, can be made to effect its objects in machines of so simple a construction, that a steam engine of one man's power, may henceforth be worked by a common fire.

Mr. Pelletan remarks, that the force of steam, so applied, may be brought directly in aid of the machine, and will enable him to double and treble his daily gains, instead of its powers being limited, as hitherto, to filling the coffers of great capitalists at a compound ratio.

The same jet of steam, when applied to the purpose of increasing the draft of furnaces, enables the proprietor to reduce their diameter to two inches, even where a large furnace is in question, to lead the smoke in any direction which may suit him best, and to make use of the whole heat produced. By means of this jet, a vacuum may be effected at will, in any given space, however considerable it may be, and permanently maintained, not only at very small cost, but through the medium of an apparatus of the simplest construction. This process is of ready application wherever evaporation or desiccation are to be effected. Acting upon

a column of air, the jet supplies the simplest and most efficacious mode which can be adopted for creating blasts in forges, furnaces, &c.

It appears that the inventor claims priority in this important discovery, inasmuch as he communicated the properties of the jet in a paper addressed to the academy in 1829, and he is tenacious of the claim in consequence of the later application of the jet in impelling steam carriages in England.—*Athenæum.*

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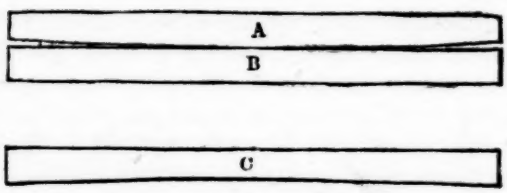
For the Young Mechanic.

## STRAIGHT EDGES.




Among mechanics, there are probably but few that do not appreciate the value of a good straight edge to ascertain the correctness of their work, and I presume that a description of the method practised, and the theory upon which it is based, will be interesting. There are doubtless many, that like myself have thought it absurd, even when told seriously by good practical workmen that it was impossible to make *one* straight edge, without making *three*, or that one plate of an air pump could not be ground flat, unless three were ground at the same time.

When I inquired the reason of this, I could get no other explanation from my informant, than that such was the fact. Although at that time I considered the idea ridiculous, I have since discovered that my friend was perfectly correct, and had he been able to have stated the cause or theory, I feel assured I should have been convinced.

I am aware in the formation of straight edges, that the size must depend much upon the work to which it is to be applied, yet some regard to the form and dimensions are advisable, as there is a certain proportion more suitable than any other. An eminent English writer* observes upon this subject, that in England they are made of thin bars of steel about one eighth of an inch thick, two inches broad, and should not exceed three feet in length, as they will otherwise be liable to bend.

Three such pieces should be prepared by planishing, and one

* Dr. Birkbeck.

edge of each made as straight as possible by the common means of filing and planing, when they are perfected by grinding them mutually with each other, fine emery and oil being added to assist the operation. They are finally to be finished with crocus martus, or a species of loam well washed to separate it from any coarse, silecious particles.

By referring to the cut at the head of our article, we will attempt to show the necessity of making three, to produce one perfect straight edge, and also of repeatedly changing them at proper intervals, until each edge is correct. Let A and B represent two steel bars prepared for grinding; let us then suppose the edge of A to be slightly convex, and that of B slightly concave, or nearly straight, then by grinding A and B together, the two edges will meet, but will not be straight, because the convex bar A, has ground the lower bar B more concave, and although the two edges come in close contact, yet the form is unchanged, and however long the grinding should be continued, the object could never be attained.

But if we now take a third bar C, the edge of which may be either concave, or convex; if concave, and we grind A and C together, the edges of B and C will then be similar, and if placed against one another, the difference will be doubled and can readily be perceived; these two are then to be ground together, and thus, the three edges being alternately and reciprocally ground together, they will mutually cut down and destroy each others' imperfections, and ultimately a perfect straight edge will be produced on all the three.

The same theory applies to the levelling of air pump plates, and other flat surfaces in machinery where great nicety is required, and the best method of producing them is, to proceed in the manner above described. J. M. W.

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From the Philadelphia Gazette.

## INCOMBUSTIBLE ARCHITECTURE.

AN IMPORTANT DISCOVERY.—C. S. Rafinesque of Philadelphia, 'Professor of Many Sciences, Architect, Draftsman, &c.,' has announced to the public, the discovery, by himself of a new mode of erecting buildings of all kinds, so as to render them entirely incombustible. He denominates this discovery by the term Incombustible Architecture, and alleges the following as the advantages of the new style, all which he offers to warrant, viz:

1. Buildings will be fire proof. 2. They cannot be set on fire on purpose. 3. They cannot catch fire from neighbors. 4. They will last longer. 5. They can be warmed in winter at 1-3d the

usual cost. 6. They will be insured at a mere trifle. 7. They will be warmer in winter. 8. They will be cooler in summer. 9. They will require no expense of fire engines and firemen. 10. They will save the lives of 100,000 persons doomed to be burnt alive. 11. They will save 100,000,000 of dollars of property doomed to be burnt. 12. They will look neater and be more convenient inside with more space, &c. &c.

These unquestionably are important considerations, and the Professor speaks most certainly of his ability to perform all he promises. The *modus operandi*, of this new style, he wisely and discreetly keeps to himself, but with magnificent liberality he offers to divulge the secret to any architect for the sum of 1000 dollars. Or if any demur at this price, he declares he will himself undertake the erection of any edifice, and receive for payment the saving in fuel and insurance, and in the expense of the building—it being part of the Professor's plan to build houses of this kind at a much cheaper rate than in the ordinary way. Certainly we bespeak much attention to the Professor's declaration.

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## ELECTRICAL MACHINES.

By R. Hare, M. D., Professor of Chemistry in the University of Pennsylvania.

Sometime since, in looking over a volume of Cavallo's Electricity, I was surprised to observe that in order to give the greater efficacy to an electric machine, he advises that the cushion, or negative poles, should be made to communicate advantageously with the earth. As the means of accomplishing this object he suggests a conducting communication 'with moist ground, with a piece of water, or with the iron work of the water pump.'

It appears from the following passage in Turner's Chemistry, a work generally of great merit, that the erroneous impression which gave rise to these suggestions, has been adopted by a more modern author. We find, page 77, American edition, the following allegation:

'The electricity which is so freely and unceasingly evolved during the action of a good electrical machine, is derived from the great reservoir of electricity, the earth. This is obvious from the fact that if the whole apparatus is insulated, the evolution of electricity immediately ceases; but the supply is as instantly restored, when the requisite communication is made with the ground. In the state of complete insulation, the glass and prime conductor are positive as usual, and the rubber is negatively excited; but as the electricity then developed is derived solely from the machine itself, its quantity is exceedingly small. When the machine is used, therefore, the rubber is made to communicate with the earth. As soon as friction is begun, the glass becomes positive and the rubber negative; but as the latter communicates with the ground it instantly recovers the electricity which it had lost, and thus continues to supply the glass with an uninterrupted current. If the rubber is insulated, and the prime conductor communicates with the ground, the electricity of the former, and all conductors connected with it, is carried away into the earth, and they are negatively electrified.'

I conceive that the earth has never, of *necessity*, any association with the phenomena of the electric machine; of which the power is evidently dependent on the efficacy of the electric, in transferring the fluid from the negative to the positive conductor. When the machine is made to act and conductors are both insulated, they are brought into states of excitement as opposite as the power of the machine is, at the time, competent to produce. If, under these circumstances, with one end of a metallic rod, (terminating in a metallic ball, or other suitable enlargement, and held by means of an insulating handle,) we touch the negative conductor, while the ball is approximated to the positive conductor, sparks at least as long, and as frequent, will be obtained, as when the negative conductor, or cushion, has the best possible communication with the earth. I conceive that any metallic surface or surfaces, duly connected with either conductor, must become virtually a part of that conductor, and partake of its excitement. In this predicament, whilst receiving a charge, are the coatings of a Leyden jar, or an association of such jars in a battery. The effect of the machine is merely to transfer the fluid from one surface to another. After the conductors, and any jar, or battery, associated with them are charged, there is no more electricity in the surfaces than before; since whatever one has gained, the other has lost.

If the impressions of the learned professor were correct, how could a battery or a jar be charged, where both it and the machine are insulated from the earth? Yet experience shows that it is under these circumstances that a charge is most easily imparted. When the conductors are in a state of excitement, and both insulated, the one will of course be as much below that of the surrounding neutral medium, and of the great reservoir, as the other is above that standard. When we connect either conductor with the earth, it returns of course to the neutral state of the earth; but the difference between the excitement of the conductors is sustained by the power of the machine to the same extent as before; hence the length and frequency of the sparks will not be found to be sensibly altered. It follows that when either of the conductors is made neutral by connexion with the earth, that the other will have its excitement as much above or below neutrality, as the sum of the difference between each of the two conductors and the terrestrial neutrality when both are insulated. Thus supposing that when insulated, the one conductor is, relatively to terrestrial electricity, minus ten, and that the positive conductor is plus ten; when the negative conductor alone is uninsulated, the positive will be plus twenty, when the latter is alone uninsulated the former will be minus twenty.

It seems to be a common, though as I believe an erroneous idea, that a spark changes its character with the conductor from which

it appears to be taken; so that when produced by presenting a body to the positive conductor, it is considered as positive, and as negative when produced with the negative conductor in like manner.

I have already observed that any conducting surface in connexion with either conductor, must act as a part of that conductor. Approximating to the negative conductor, a body (a ball, for instance,) while in communication with the positive conductor, is really enlarging or elongating the surface of the latter, so that when the spark passes, it must still be from the positive to the negative pole: and vice versa, elongating the surfaces associated with the negative conductor, till sufficiently near the positive conductor to receive a spark, does not alter the character of the phenomenon. In each case, according to the theory of one fluid, a current passes from the positive to the negative pole, and according to the doctrine of two fluids, two currents pass each other.

The cause of the difference observed in the sparks in the two cases is, that they are usually received from a small knob upon a big ball, or the hand; or some other body comparatively large.

Whenever the fluid is contracted into a small jet on the positive side, its projectile power is increased; while under the opposite circumstances, its projectile force is lessened. This is the sole cause of the long forked erratic form, of what is called the positive spark; and the short stubbed appearance of what is called the negative spark. The whole difference may be effected in whatever situation the sparks may be taken, by causing a large and a small ball to exchange sides. When the surface on the positive side is so small as to condense the electric matter before it jumps, the projectile force is greater, and, as in the case of the jet pipe in hydraulics, there is a medium size at which the greatest projectile power is obtained. When the emitting surface is too large, the projectile force is lessened, and the spark consequently made shorter.

The following passage in Cavallo's Electricity is that alluded to above. See vol. 1st, page 184: London, 1786.

'Sometimes the machine will not work well because the rubber is not sufficiently supplied with electric fluid; which happens when the table upon which the machine stands, and with which the chain of the rubber is connected, is very dry, and consequently in a bad conducting state. Even the floor and the walls of the room are in very dry weather bad conductors, and they cannot supply the rubber sufficiently. In this case the best expedient is to connect the chain of the rubber, by means of a long wire, with some moist ground, a piece of water, or with the iron work of the water pump, by which means the rubber will be supplied with as much electric fluid as is required.'

The learned author is, I think, altogether wrong in imagining that the dryness of adjacent bodies can have any ill effect. In common with the great mass of electricians of this time, as well as his contemporaries, he has overlooked a real cause of deterio-

ration. I allude to the imperfect conducting power of cushions, made as they are usually, of silk, or leather stuffed with hair, or other nonconducting substances. The desiccation of the cushion and other parts of the rubber, may counteract the benefit otherwise produced by any increase of aridity in the surrounding medium.

By stuffing the cushions with the elastic iron shreds scraped off from weaver's reeds in manufacturing them, and making a communication between the shreds and the steel spring supporting the cushion and attached to the negative conductor, I have seen the sparks yielded by a machine more than trebled in length and frequency.

As a coating for the cushion, upon the whole, I find the aurum musivum, more efficacious than the amalgam usually employed, which is apt to adhere to the glass, and promote the passage of sparks from the cushion to the collecting points of the positive conductor. I question if the amalgam does not owe its efficacy to its conducting power, which tends to compensate the absence of this property in the cushion.

In speaking of experiments performed by means of electrical machines, the poles and conductors may in general be treated as synonymous; yet strictly the poles are those parts of the conductors, or conducting surfaces in connexion with them, between which the discharge takes place; so that when insulated metallic rods, however long, are each at one end in contact with the conductors of the machine, the poles may be at the other ends of the rods. This view of the subject is generally recognised in the case of Voltaic series, which not being terminated by conductors, in the technical sense used in speaking of the machine, gives rise, in this respect, to less cause of misapprehension.

I conceive it an error to suppose that the association of a large conductor with a machine contributes to the intensity of the sparks. It appears to me to render the sparks shorter, and less frequent, though otherwise larger.

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## PATENTS FOR MASSACHUSETTS.

*Granted in October,* 1832.

From the Journal of the Franklin Institute.

For an improvement in the *Machinery for manufacturing Paper;* patented by John Ames, Springfield, Massachusetts, May 14, 1822. Patent surrendered, cancelled, and reissued under an amended specification, October 25, 1832.

In the original specification, a very general and imperfect description of the machinery was given, without the slightest intima-

tion of what was considered by the patentee as his improvement. The machine is of the cylinder kind first invented in France, and which has since undergone many improvements there, as well as in England and in this country; and by the amended specification it appears that the invention of the patentee consisted in the particular way in which he constructed his cylinder, his claims being in the following words,—' What I claim as new, and as my invention, is the construction and use of the peculiar kind of cylinder above described, and the several parts thereof in combination for the purpose aforesaid.'

This apparatus having been long in use, and well known, we do not consider it as necessary to describe the cylinder as it is constructed by Mr. Ames.

For an improvement in *Cutting Pliers;* Russell Curtis, Springfield, Hampden county, Massachusetts, October 25.

The improvement here claimed consists in the insertion of steel cutting dies, in dovetail grooves prepared for the purpose, instead of making the cutting part in one piece with the pliers. Different forms of pliers, and places for the insertion of the dies are referred to in the description, but the foregoing is the essential point of the invention. Although a simple, we think it a very good thing; in point of principle it is not new, but it may be so in its application to pliers.

For *Machinery for Hammering or hardening Taps, or Soles, for Boots and Shoes;* Stillman Knowlton, Athol, Worcester county, Massachusetts, October 25.

Instead of hammering the leather, it is to be passed between two rollers, one placed above the other like the rollers of a flatting mill; the rollers are not to be cylindrical, but one of them, the upper, is to be concave, and the other convex, so that the leather, when rolled, shall be in a proper shape for the last. The gudgeons of the lower roller, raise by a moveable lever, and it is forced against the upper roller by placing the foot upon a treadle; a spiral spring relieving it when the foot is removed. The operator places one end of the leather between the rollers, puts his foot on the treadle, and then, with his right hand, turns a crank, which by means of wheels and pinions, gives motion to the rollers. The leather, it is observed, may be hardened to any degree; according to the will of the operator, and one man can perform as much work as ten in the usual way.

The claim is to ' the position of the rollers, the one being placed above the other, and the application of the spiral spring.' If this machine is new, and operates as well as it is said to do, and we see no reason why it should not, we think the claim most palpably defective. The rollers might, with equal advantage, be placed side by side, and the effect of the spiral spring rendered

unnecessary by other contrivances. The claim, it seems to us, should have been to the rolling of leather for soles, between rollers of the kind described, instead of hammering them, as has been heretofore done; one of the rollers being so fixed as to admit of its being forced against the other by means of levers, or other suitable contrivances.

For *Fireplaces for the burning of Anthracite or other Fuel;* Artemus Turrell, Boston, Massachusetts, October 25.

The grate upon which the fuel is to be burnt, is on a level with the hearth, there being an air flue from below, or from without the room, leading to it. A sort of forked poker, which the patentee calls a picker, rises through the bars of the grate, to disturb the fire, and is to be moved by a lever. These are the two things claimed, and they do not, as represented, induce us to break the tenth commandment.

For a *Rack Wrench*, for turning the nuts of screws; Henry King, Springfield, Hampden county, Massachusetts, October 25.

This is intended as a substitute for the screw wrench, to which we think it superior in all respects. The main bar of the wrench is square, and the upper side of it is notched across, to receive a click. The sliding cheek of the wrench is supported by a piece projecting from the back of it which rests upon the bar. This carries a spring and click, and when the wrench is to be used, all that is necessary, is to push the sliding piece against the nut, the spring forcing the click into one of the notches on the bar, and thus holding it in its proper place.

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## Miscellany.

*Stocking Knitter.*—Mr. M'Mullen, of Birmingham, Huntington county, Pennsylvania, has constructed this machine; it is small, occupies but a little space and requires about as much power as a common hand organ to turn its crank, except when a stitch is dropped or one required to be added. The machine can do the work of six expert knitters. The cost, about fifteen dollars, including the patent right. It is adapted for knitting wool, but may be used for cotton, silk or thread.

*Anthracite Coal for Steam.*—The Albany Argus states that Dr. Nott has successfully applied Anthracite coal to steam boilers in the furnace of Messrs. H. Nott & Co. of that city. Extensive machinery is moved by steam produced by a flame which arises from hard coal thirty or forty feet from the furnace in which it is burnt.

*Reach of Voice—Extent of Churches.*—The Romanists built large churches; it was enough if they heard the murmur of the mass, and saw the elevation of the host; but ours are to be fitted for auditories. I can hardly think it practicable to make a single room so capacious with pews and galleries, as to hold above 2000 persons, all to hear the service and see the preacher. The position of the pulpit requires a consideration; a moderate voice may be heard fifty feet distant before the preacher, thirty feet on each side, and twenty behind; and not this unless the pronunciation be distinct and equal, without dropping the voice at the end of the sentence. A Frenchman is heard farther than an English preacher, because he raises his voice at the last words of a sentence, like the Roman orators. A church should therefore be ninety feet long, sixty broad, besides a chancel at one end, a belfry and portico at the other.—*Wren—Lives of Architects.*

*Dr. Franklin.*—The leading property of Dr. Franklin's mind—great as it was—the faculty, which made him remarkable, and set him apart from other men;—the generator, in truth, of all his power—was GOOD SENSE—only plain, good sense—nothing more. He was not a man of genius; there was no brilliancy about him, little or no fervor; nothing like poetry, or eloquence; and yet—by the sole, untiring, continual operation of this humble, unpretending quality of the mind, he came to do more in the world of science; more, in council; more, in the revolution of empires, (uneducated—or self-educated as he was,) than five hundred others might have done; each with more genius, more fervor, more eloquence, and more brilliancy.—*Blackwood's (English) Magazine.*

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## QUESTION.

WHAT is the weight sustained by a pile, when a cast iron hammer of one ton weight is let fall from a perpendicular height of 39 feet, with nothing to impede its force?

If any of your correspondents will answer the above question, as it is a dispute among practical mechanics, they will oblige A SUBSCRIBER.

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## TO CORRESPONDENTS.

E. G. is received, but is necessarily deferred till our next number.

We trust our various correspondents will bear us in mind during the warm months.